


Efficacy of Peer Networks to Increase Social Connections Among High School Students With and Without Autism Spectrum Disorder

Exceptional Children
2015, Vol. 82(1) 96–116
© 2015 The Author(s)
DOI: 10.1177/0014402915585482
ec.sagepub.com


**Julia M. Hochman¹, Erik W. Carter¹, Kristen Bottema-Beutel²,
Michelle N. Harvey¹, and Jenny R. Gustafson¹**

Abstract

Although peer interaction takes on increased salience during adolescence, such social connections remain elusive for many high school students with autism spectrum disorder (ASD). This social isolation can be particularly prevalent within unstructured school contexts. In this study, we examined the effects of a lunchtime peer network intervention on the social engagement and peer interactions of four adolescent students with ASD. Upon introduction of the peer networks, we observed substantial increases in the percentage of intervals containing peer interactions and social engagement across all participants. Further, students with ASD, peer partners, and school personnel all considered the intervention to be acceptable and feasible. We offer recommendations for research and practice aimed at enhancing the efficacy and social validity of peer-mediated interventions at the secondary school level.

The contributions of peer interactions and affiliations to indicators of well-being have been a long-standing focus of research. Among children and adolescents, this link between social and developmental outcomes has been particularly strong (Killen & Coplan, 2011; Ryan & Ladd, 2012). For students with autism spectrum disorder (ASD), however, such social connections are often tenuous or elusive. Persistent social communication and interaction deficits are central to the ASD diagnosis (American Psychiatric Association, 2015; Individuals With Disabilities Education Act, 2006) and can limit both the quantity and quality of interactions students have with peers in school. Although the benefits of promoting peer interaction among students with and without disabilities are cited frequently in literature addressing inclusive education, educators often struggle to build these social connections for adolescents with autism (Carter, Bottema-Beutel, & Brock, 2014; Webster & Carter, 2007).

Students with autism are spending an increasing proportion of their school day in general education classrooms and other inclusive school settings (McLeskey, Landers, Williamson, & Hoppey, 2012). However, merely increasing proximity to peers without disabilities does not lead to increased social interactions for students with ASD. Instead, research suggests planned intervention efforts are needed to ensure the opportunities and supports are in place that set the occasion for peer interaction and shared learning (Carter, Hughes, Guth, & Copeland, 2005; Carter, Sisco, Brown, Brickham, & Al-Khabbaz,

¹Vanderbilt University

²Boston College

Corresponding Author:

Erik W. Carter, PhD, Department of Special Education,
Vanderbilt University, PMB 228, Peabody College,
Nashville, TN 37203, USA.

E-mail: erik.carter@vanderbilt.edu

2008). Indeed, a number of peer-mediated interventions (e.g., peer support arrangements, peer tutoring, peer partner programs) have been found effective at promoting social interactions among students with and without severe disabilities, including students with autism (e.g., Carter, Sisco, Chung, & Stanton-Chapman, 2010; Hughes et al., 2013).

Peer-mediated interventions have emerged as an effective avenue for promoting peer interactions and improving academic and social outcomes for students with ASD in a variety of school settings.

Although growing attention has been directed toward increasing interactions within both general and special education classrooms, less is known about how to foster social connections in the noninstructional contexts that are part of every school day. Among the most opportune school settings in which to promote social interactions may be the cafeteria during lunch. This daily period allows students to socialize with peers without competing academic demands, classroom rules that may limit social-related conversations, or access to a limited range of classmates. Although lunch can be a primary window within the school day when sustained adolescent interactions take place, it may also be among the more socially isolating times of the day for students with ASD and other developmental disabilities. Additional research is needed to identify promising intervention approaches that can be delivered within these particularly social settings at the high school level.

Peer-mediated interventions have emerged as an effective avenue for promoting peer interactions and improving academic and social outcomes for students with ASD in a variety of school settings (Bene, Banda, & Brown, 2014; R. Koegel, Fredeen, et al., 2012; Owen-DeSchryver, Carr, Cale, & Blakeley-Smith, 2008; Radley, Ford, Battaglia, & McHugh, 2014). Moreover, students are more familiar than adults with the prevailing peer culture and can serve as especially

effective models of acceptable social behavior. Much of this peer-mediated research, however, has involved peers providing instructional support within classrooms or within dyadic arrangements. During adolescence, dyadic relationships often give way to a preference for interactions within small groups or cliques (Rubin, Bukowski, & Laursen, 2009). Affiliations with networks of peers provide a context within which adolescents may develop friendships and supportive relationships. For adolescents with ASD, participation in these types of social groups remains especially limited (Wagner, Cadwalader, Garza, & Cameto, 2004).

Relatively few studies have evaluated interventions for noninstructional settings that emphasize building a social network for a student with disabilities. *Peer network interventions* are individualized interventions that emphasize social connections beyond the classroom by establishing a cohesive social group that meets formally and informally across an entire semester or school year (Carter et al., 2013). Garrison-Harrell, Kamps, and Kravitz (1997) examined the effects of peer networks on the social-communicative behaviors of elementary students with autism, three of whom were observed in lunch. During baseline, interactions rarely occurred. Upon introduction of the peer networks, students dramatically increased their time engaging in social interaction, use of augmentative and alternative communication, and use of expressive language. Haring and Breen (1992) established peer network interventions for two middle school students with moderate to severe disabilities. Participants increased both the quantity and quality of their peer interactions as well as developed new friendships. These and other studies involving younger students suggest peer network interventions may also hold promise for improving the social outcomes of adolescents with ASD. To date, no studies have focused on the implementation of peer networks within high schools as an avenue for creating social connections during lunch.

The purpose of this study was to examine the efficacy and social validity of peer network

interventions for adolescents with ASD. We sought to answer the following research questions: First, can peer network interventions implemented in lunchrooms increase the peer interactions and social engagement of high school students with autism? Second, to what extent do social outcomes generalize to times when peer networks are not meeting? Third, how do students, peers, and school staff view the acceptability and feasibility of these intervention approaches?

Method

Participants: Students With ASD

Four adolescents with ASD, ranging in age from 15 to 17, participated in this study. To be included, high school students were required to (a) have an educational or medical diagnosis of ASD, (b) be nominated by their special education case manager as someone who would benefit from a peer network, (c) have social-related goals in their individualized education program (IEP) or exhibit difficulties performing age-appropriate social skills, and (d) provide assent and parental consent. Institutional review board approval and district approvals were obtained.

Brody. Brody was a 15-year-old Hispanic male in the ninth grade. He received educational services in a self-contained classroom but attended one general education class per day (i.e., physical education). Brody had a primary special education label of ASD and a secondary label of intellectual disability. He was eligible for the state's alternate assessment, received extended school year (ESY) services, and participated in the free/reduced-price meals program. According to teacher ratings on the Social Skills Improvement System (SSIS; Gresham & Elliot, 2008), Brody was in the 17th percentile for appropriate social skills, the 96th percentile for demonstrating problem behaviors, and the 26th percentile for academic competence. Brody's composite score of 68 on the Vineland Adaptive Behavior Scales-II (VABS-II; Sparrow, Cicchetti, & Balla, 2005) was in the second

percentile, with the communication domain in the first percentile, both indicating low overall adaptive functioning. However, Brody's socialization domain score of 76 was in the fifth percentile, representing moderate-to-low adaptive functioning in this area. A rating of 32.5 on the Childhood Autism Rating Scale-2 (CARS-2; Schopler, Van Bourgondien, Wellman, & Love, 2010) was indicative of mild to moderate ASD symptoms. Brody's IEP did not contain specific social goals, as he was viewed by school staff as quite social and initiated often to peers. However, his social interactions were observed to be repetitive and inappropriate, and he rarely maintained a conversation beyond two turns. For his peer network, his social-related goal was to maintain a conversation with peers for more than two turns.

Matthew. Matthew was a 17-year-old European American male with a primary special education label of ASD and a secondary label of intellectual disability. Enrolled in the 11th grade, he participated in a "life skills" curriculum in the special education classroom for 3.5 hr a day (50%) and attended general education classes for the remaining 3.5 hr a day (50%) without paraprofessional support. He was eligible for the state's alternate assessment and received ESY services. According to his special education teacher's ratings on the SSIS, Matthew was in the eighth percentile for appropriate social skills, the 82nd percentile for problem behaviors, and the 61st percentile for academic competence. His composite score on the VABS-II was a 68 (second percentile), with social and communication domains in the first percentile. He received a raw score of 32.5 on the CARS-2, indicating mild-to-moderate ASD symptoms. Matthew's special education case manager described him as verbal but having difficulty initiating conversation and sustaining interactions. His social-related IEP goals addressed participating in small-group discussions, initiating appropriate interactions, and interacting appropriately with peers in a group. For his peer network, his social-related goal was to increase initiations to peers.

Taylor. Taylor was a 15-year-old African American male enrolled in the 10th grade. His primary special education label was intellectual disability, with a secondary diagnosis of ASD. Although most of his instruction was provided in a self-contained special education classroom, Taylor attended one general education art and computer class with support from an individually assigned paraprofessional. Taylor was eligible for the state's alternate assessment and participated in the free/reduced-price meals program. According to the SSIS, Taylor was in the first percentile for appropriate social skills, the 91st percentile for demonstrating problem behaviors, and the third percentile for academic competence. His VABS-II composite score was 46, placing him below the first percentile. He also had severe ASD symptoms, as evidenced by a raw score of 52 on the CARS-2. Taylor was minimally verbal with a communicative repertoire including head nods, smiling, laughing, and repeating phrases. His social-related IEP goals addressed using words and picture symbols to initiate greetings and maintain social exchanges and maintaining eye contact. In his peer network, his social-related goal was to initiate to peers.

Kevin. Kevin was a 15-year-old African American male enrolled in the 10th grade. He had a primary special education diagnosis of intellectual disability and a secondary diagnosis of ASD. He was included in general education classes for 50% of the school day. Kevin was eligible for the state's alternate assessment and participated in the free/reduced-price meals program. SSIS ratings placed Kevin in the 10th percentile for appropriate social skills, the 97th percentile for demonstrating problem behaviors, and below the first percentile for academic competence. His composite score of 60 on the VABS-II was also below the first percentile in all domains. According to ratings on the CARS-2, his raw score of 40.5 reflected severe ASD symptoms. According to his IEP, Kevin could initiate conversation and independently maintain interactions for up to two exchanges. However, conversations were typically limited to a narrow set of personal interests. His social and communication-related IEP goals addressed

maintaining appropriate social exchanges with one prompt, answering "wh" questions, retelling stories or events, and maintaining appropriate eye contact. For his peer network, his social-related goal was to refrain from socially inappropriate manual stereotypy (i.e., using his hands as puppets).

Adult Facilitators

After we provided an overview of the project, school representatives nominated special education staff they considered appropriate to serve as network facilitators. One special educator and two professionals served as facilitators for this study. The special educator was a European American male who facilitated networks for Brody and Matthew. He had a master's degree and 25 years of experience as a licensed K–12 special education teacher, 20 years of which were spent at his current school. The facilitator of Taylor's group was an African American female with some college-level course work. She had worked as a paraprofessional for 28 years. The facilitator for Kevin's groups was an African American male with a bachelor's degree. He had served as a paraprofessional for 5 years. None of these school staff reported having previous experience implementing a social-focused peer group for a student with severe disabilities.

Participants: Peers Without ASD

After providing facilitators individual, 1-hr orientations to the peer network intervention, we asked them to recruit peers without ASD to serve as network members. We encouraged facilitators to consider peers who were dependable, were already part of an existing network of friends, had shown interest in students with disabilities, or had demonstrated appropriate social skills. Eleven students without a disability participated in this study. Matthew's group included three European American females who were all seniors and 18 years old. Brody's network also included three peers, all of whom were 16 years old and juniors. Two of these females were Kurdish and one was Asian. Kevin's peer network ini-

tially included one male and two female peers. Although all three consented and were trained, only one completed the study due to scheduling conflicts. Kevin's peer partner was a 17-year-old European American in the 11th grade with a learning disability. Taylor had two peer partners who were seniors and female: One was 17 years old and African American, and the other was 18 years old and biracial.

All peers attended the same high schools as the participants with ASD. The facilitator for Matthew's and Brody's groups recruited peers from existing social groups he considered to be dependable and who shared the same lunch period. The facilitators for Kevin's and Taylor's networks approached peers who had previous experience with the students with ASD or had been seen interacting with the students. Only Kevin's peer partner reported having prior experience in a "peer group" for students with disabilities.

Setting

Students attended one of two large, ethnically diverse high schools located in an urban school district. At both schools, network meetings were held in the cafeteria during regularly scheduled 30-min lunch periods. Matthew and Brody attended a school with an enrollment of just over 1,200 students. More than 70% were racial or ethnic minorities and over 80% were eligible for free/(to make it consistent with how you did this in the participants section. reduced-price meals. On a typical day, approximately 200 general education students, 10 students with severe disabilities, and five school staff members were present in the cafeteria. Although there were no assigned tables or designated areas for students with disabilities at this school, the students with severe disabilities typically sat together at tables in the middle of the cafeteria.

Kevin and Taylor attended a high school with approximately 700 students. More than 80% were from racially or ethnically diverse backgrounds and 85% were eligible for free/(to make it consistent with how you did this in the participants section. reduced-priced meals.

During a typical day, an average of 75 general education students, 10 students with severe disabilities, and eight adults were present in the cafeteria during the lunch periods we observed. Round and rectangular tables were spread throughout the lunchrooms with open seating for all students. At this school, students with severe disabilities typically sat in a cluster together on the periphery of the cafeteria along with special education staff.

Design and Study Conditions

We used a multiple baseline design across participants to evaluate the impact of peer network strategies on the social engagement and peer interactions of adolescents with ASD. We collected generalization probes on days when network meetings were not formally scheduled.

Baseline Phase

For all participants, we collected baseline data during the student's 30-min lunch period. Both schools operated on a block schedule with alternating "A" and "B" days. At Matthew's and Brody's school, the specific students present during lunch varied on A and B days. Because Matthew's and Brody's networks were scheduled on A days, their peer partners were not present in the cafeteria on B days when Matthew and Brody had lunch. However, other peers without disabilities were present. During baseline, Matthew and Brody each sat with three to five other students with severe disabilities at a table centrally located in the cafeteria. The special education case manager and two paraprofessionals were typically present for the duration of the lunch period. Brody and his peers with severe disabilities arrived to the cafeteria for lunch 15 min early each day but stayed for the entire scheduled lunch period. Matthew walked to the cafeteria at the same time as peers without disabilities following the general education bell schedule. Although several peers participating in a credit "peer buddy" program were in the vicinity and occasionally assisted other students with disabilities throughout the lunch

period, these peers did not serve as peer partners in this study. No directives were given to any students with or without disabilities to interact (or avoid interacting) with Matthew or Brody during baseline or on days the network did not meet once intervention began. During the baseline phase, peers without disabilities were observed occasionally to greet participants.

For most of the semester in which this study was conducted, Kevin and Taylor participated in community-based instruction 3 days a week and were present on campus during lunch only on Thursdays and Fridays. On these days, Kevin and Taylor sat with other students with severe disabilities at a table chosen by special education staff. The two paraprofessionals typically were present for the duration of the lunch period. The table was located on the outside perimeter of the seating area but near the food line and easily accessible to peers without disabilities eating in the same cafeteria.

Peer Network Intervention Phase

Training for adult facilitators. All three peer network facilitators participated in individual training sessions with two members of the research team (i.e., a coach and the project coordinator). The facilitator for Matthew's and Brody's peer networks attended a single 60-min orientation session. The facilitators for Kevin's and Taylor's peer networks participated in two 30-min sessions. We provided each facilitator a printed peer network manual to reference throughout the training and intervention phase. During the training, we provided an overview of the study, explained the rationale for using peer networks, reviewed each section of the manual, modeled social-related facilitation strategies, and answered questions. Topics discussed included (a) the goals of the peer network, (b) strategies for identifying and recruiting peers, (c) selecting a social-related goal for the student with ASD to be addressed in network meetings, (d) teaching peers how they might support progress toward the social-related goal, (e) hosting an initial orientation for participating

students, (f) facilitating weekly peer network meetings, (g) providing feedback and support to students, and (h) fading proximity and direct support to students. The coach provided ideas on activities for network meetings, possible conversation topics, and promising social facilitation strategies. Social facilitation strategies included redirecting questions and comments to the group, filling in awkward silences, finding a role in the activity for everyone, drawing the focus student into the conversation or activity, highlighting shared interests ("Sarah, you are a varsity athlete. Did you know Brody is on the bowling team?"), providing the optimal level of support, and shifting support provided to the focus student from adult to peer partners (e.g., Carter, Cushing, & Kennedy, 2009). A training outline and manual were used with all facilitators, and 100% of topics were covered across trainings.

Student orientation meeting. Upon identifying potential peer partners, facilitators approached them individually or in small groups. They shared a brief rationale for peer networks and provided consent forms to all interested peers. Once consented, and with support from the intervention coach, each facilitator led an initial orientation meeting involving the peer partners and the focus student. Meetings were scheduled during lunch and held in the cafeteria. The purpose of the meeting was for all group members to learn about one another, discuss the goals of the network, share ideas for increasing interactions with each other, determine when interactions could occur outside of the scheduled meetings, address the importance of maintaining confidentiality, ask any questions, suggest activities for future meetings, and establish a regular weekly meeting day. During this same meeting, the social-related goal identified for each student was shared with the group, and strategies for addressing the goal were offered and modeled by the coach. We provided the facilitators with an orientation meeting checklist consisting of 10 questions: (a) Was the focus student present? (b) Were all peer partners in attendance? (c) Did the partners and focus students

introduce themselves and participate in activities? (d) Did students mention any shared interests? (e) Were the goals for the group discussed? (f) Did the group discuss ways to work toward goals of the group? (g) Was the importance of confidentiality and respectful language discussed? (h) Did the group talk about when social interactions could occur? (i) Were suggestions on ways to interact socially provided? and (j) Did the group schedule regular meetings or discuss the date of the next meeting? After the orientation meeting, the coach and facilitator independently noted each element addressed.

For Brody's and Matthew's orientation meetings, the facilitator indicated all 10 of these elements occurred, although the coach recorded only nine components, as she did not observe the group discuss ways to work toward goals of the network in either meeting. For Taylor's orientation meeting, the coach observed 100% of the required elements. The facilitator for Taylor's network did not complete an orientation meeting checklist. During Kevin's orientation meeting, both the coach and facilitator reported 100% of the components were met.

Weekly network meetings. Weekly peer network meetings were scheduled for 30 min during a regularly scheduled lunch period. Students with ASD and their peer partners selected a table in the cafeteria to gather as a peer network. Each meeting incorporated time to eat, participate in a shared activity (e.g., board games, question box, making Valentine's Day cards), converse about a selected topic (e.g., spring break activities, school events, sporting events), reflect on how meetings were going and how the group could be expanded, share ideas for new activities, discuss upcoming events students could do together, and report interactions occurring outside of weekly meetings. Peer partners initiated conversation, prompted interactions, planned and participated in activities, and modeled appropriate social skills. Throughout the semester, additional peers without disabilities sometimes joined the group for part or all of lunch, but these students did not participate

in the initial orientation. During weekly meetings, the facilitators were asked to be present for at least 10% of the meeting and to use the social facilitation strategies they learned during the training. The facilitator also shared upcoming school events network members could attend outside of lunch and reminded the partners to schedule the next meeting. After each peer network meeting, the facilitator and coach independently completed an intervention fidelity form and subsequently reviewed the documents together. When the facilitator failed to complete any aspects of the intervention listed on the fidelity form or if interactions between peers and focus student declined from the previous week, the coach provided feedback and additional instruction. Table 1 displays fidelity data.

Generalization probes. For all participants, generalization probes were conducted once peer week on non-network meeting days. All probes were planned to align with the lunch periods when all social network members and the focus students with autism were scheduled to be in attendance. On probe days, meetings were not facilitated, no instructions were given, and all students could sit wherever they chose. If the student with autism and his peer partners decided to sit together, the facilitator did not intervene or assist in any way.

Measures

Trained observers recorded data on students' social interactions, social engagement, and targeted social-related goal using partial-interval recording (15 s observe, 15 s record). We collected data on who was in proximity to the focus student (i.e., peer partner, other peer, other students with disabilities, school staff, facilitator) every 30 s using momentary time sampling. At the end of each observation, data collectors recorded the occurrence of adult facilitative strategies utilized at any time during the session.

Social interactions. We defined *social interactions* as any occurrence of verbal (e.g., speech, speech-generating devices) or nonverbal (e.g.,

Table I. Treatment Fidelity Findings Based on Observer (O), Coach (C), and Facilitator (F) Checklists (in percentages).

Question	Brody				Matthew				Taylor				Kevin			
	O	C	F	O	C	F	O	C	O	C	F	O	C	F	O	C
Common questions																
Was the focus student present for majority of meeting?	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Were at least two of the network members in attendance?	90	100	88	88	100	100	100	40	33	0	33	0	0	0	0	0
Did network members participate in activities appropriately?	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Did the focus student participate in activities or conversation appropriately?	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Was the targeted social-related goal addressed?	67	100	100	100	100	100	80	50	100	100	100	100	100	100	100	100
Was the facilitator present at least 10% of the time?	75	89	88	88	100	100	100	100	100	100	100	100	100	100	100	100
Did the facilitator encourage discussion and give prompts as needed to keep the activity and conversation moving along?	38	—	75	63	—	100	60	—	0	67	—	60	—	60	—	60
Did the group discuss date of next meeting?	89	100	100	63	100	100	80	67	67	80	67	67	80	80	80	80
Did network members suggest activities or conversation topics for next meeting?	63	100	100	29	83	86	25	33	33	50	33	50	76	80	80	80
Coach-specific questions																
Was an activity or conversation planned for the meeting?	—	89	—	—	100	—	—	67	—	—	—	—	75	—	—	—
Were appropriate materials provided?	—	100	—	—	100	—	—	100	—	—	—	—	100	—	—	—

Note. Values represent the percentage of intervention phase observations during which the answer was recorded as yes. Dash indicates the question was not asked.

gestures, signs) behaviors that appeared to have communicative intent. We did not consider reading aloud or echolalic behavior to be social interactions unless they were clearly directed toward another person; self-talk was never coded as an interaction. We differentiated between communicative behaviors from the focus student directed to another person (i.e., focus student to peer partner, focus student to another peer, focus student to another student with a disability, focus student to an adult) and communicative behaviors directed to the student with ASD (i.e., peer partner to focus student, another peer to focus student, student with disability to focus student, adult to focus student). When interactions involved multiple people, we separately coded each person involved in the interaction. We coded communicative behaviors as being directed toward a group when multiple people were present and the specific intended recipient could not be clearly determined or when communicative behaviors were clearly directed toward the entire group.

Social engagement. We assessed social engagement using three mutually exclusive codes: active, passive, or unengaged. We defined *active* social engagement as intervals including any communicative behavior directed to a peer by the focus student. We defined *passive* engagement as being in proximity to students and attending to the social conversation of other students for at least 5 consecutive seconds in an interval but making no active contributions to the conversation. We defined *unengaged* as attending to something other than the ongoing social exchanges among students, whether in or out of proximity to them. The focus student was coded as gone if he was physically absent from the observation setting for the duration of the interval. Thus, whereas social interactions reflected only actual conversational turns, engagement more broadly captured whether students were participating at all in ongoing group conversations.

Social-related goal. Prior to beginning intervention, we asked teachers to determine a social-related goal that would be addressed by

the peer network. Targeted social-related goals were operationally defined for each student with autism and are listed in the Participants section. We used partial-interval recording (15 s observe, 15 s record) to note whether the targeted goal was observed at any time during the 15-s interval.

Proximity. At the end of each 15-s observation interval, we coded the student with ASD as being in proximity to a peer partner, other peer without ASD, student with disabilities, network facilitator, or other school staff if he was within 5 feet of another person and physically positioned to interact socially with that person(s). To be in proximity, students would not have to change their physical orientation or position to communicate with each other.

Facilitator support behaviors. At the end of each network meeting, observers completed a checklist recording the occurrence of any support behaviors displayed by the facilitator: prompt student to interact with other peers, encourage other peers to interact with the student, explicitly teach student specific social skills, prompt student to use aided communication devices, model specific social skill, praise social or communication attempts and behaviors, provide emotional support or give advice, and help student self-manage his own behaviors. Each behavior was recorded as either occurring at any time during the entire observation or not occurring at all. We did not record the frequency of each discrete behavior.

Social comparison data. We used social comparison data to establish a range of typical social interaction in the two lunchrooms in which we observed. Using observation procedures already described, we collected data on the social interactions, social engagement, and proximity of peers without disabilities present in the same lunchroom. We randomly selected three different male peers for each focus student and observed an entire lunch period; this resulted in 12 peer comparison observations (six at each school). We established a range of typical social interaction as one standard deviation above and below the

mean of the six observations conducted in each lunchroom, respectively.

Observer Training and Interobserver Agreement (IOA)

Five special education graduate students and the project coordinator served as data collectors. Observers first read and collectively reviewed a coding manual for this project. Observers were required to achieve 90% reliability on three practice videos and in three in vivo sessions in a high school cafeteria. IOA was collected for 39%, 27%, 50%, and 41% of sessions for Brody, Matthew, Taylor, and Kevin, respectively. We calculated overall interval agreement by dividing the total number of intervals in which observers agreed by the total number of intervals and multiplying by 100%. We then averaged agreement results across observation sessions for each participant and report mean and range across participants as follows: proximity to peer partner (99.7%; 98.7%–100%), other peers (97.0%; 91.7%–99.5%), other students with disabilities (96.6%; 89.3%–99.5%), network facilitator (97.1%; 89.7%–100%), or other educators (96.8%; 90.0%–99.4%); social interactions from focus student to other students with disabilities (98.7%; 97.4%–99.6%), peer partners (92.4%; 88.9%–95.9%), other peers (97.9%; 94.2%–100%), or adults (97.1%; 95.4%–98.0%); social interactions to the focus student from other students with disabilities (98.8%; 97.4%–100%), peer partners (94.3%; 92.9%–95.7%), other peers (98.0%; 95.6%–99.6%), or adults (96.7%; 95.9%–98.3%); social engagement (91.0%; 87.5%–96.0%); facilitative support behaviors (91.7%; 87.9%–94.2%); and focus student's goals (90.1%; 83.9%–95.9%).

Social Validity

We assessed social validity at the end of the semester using surveys containing both Likert-type and open-ended questions. The survey for students with ASD and their parents included questions about the child's peer network, friendships, and enjoyment of school. Response

options were *yes*, *no*, and *I don't know*; space to elaborate was provided. We sent surveys by mail to parents, and school staff read questions to students with autism (if necessary). The facilitator survey included 20 statements addressing the amount of time and support required to implement the network, their interest and motivation to implement the intervention, and their perceptions of benefits for participating students, all rated on a 5-point Likert-type scale. Five open-ended questions addressed what went well, what could have been better, what (if anything) changed for the student with autism as a result of being in the project, what (if anything) changed for peers as a result of being in this project, and what (if anything) changed for the facilitator as a result of being in the project. Peer partners completed a similar survey (19 items) that also asked if they would recommend the group to other students and if the school should have more groups in the future. Four open-ended questions were included.

Results

Peer Interactions

Figure 1 displays the percentage of intervals containing any peer interactions to or from participating students with ASD during baseline, intervention, and generalization probe phases. Gray bars indicate peer comparison social interaction data. During baseline phase observations, peer interactions between the focus students and any peers without disabilities occurred infrequently, despite both groups being in the same cafeteria. For all four students with ASD, the mean percentage of baseline intervals containing any type of peer interactions (i.e., focus student to and from peer or peer partner) ranged from 0% to 14% (see Table 2). Baseline levels of interactions were generally stable and flat with a decelerating trend for Brody.

Upon introduction of the peer network, we observed substantial increases in both the level and average percentage of intervals containing peer interactions across all students. Although peer interaction remained high

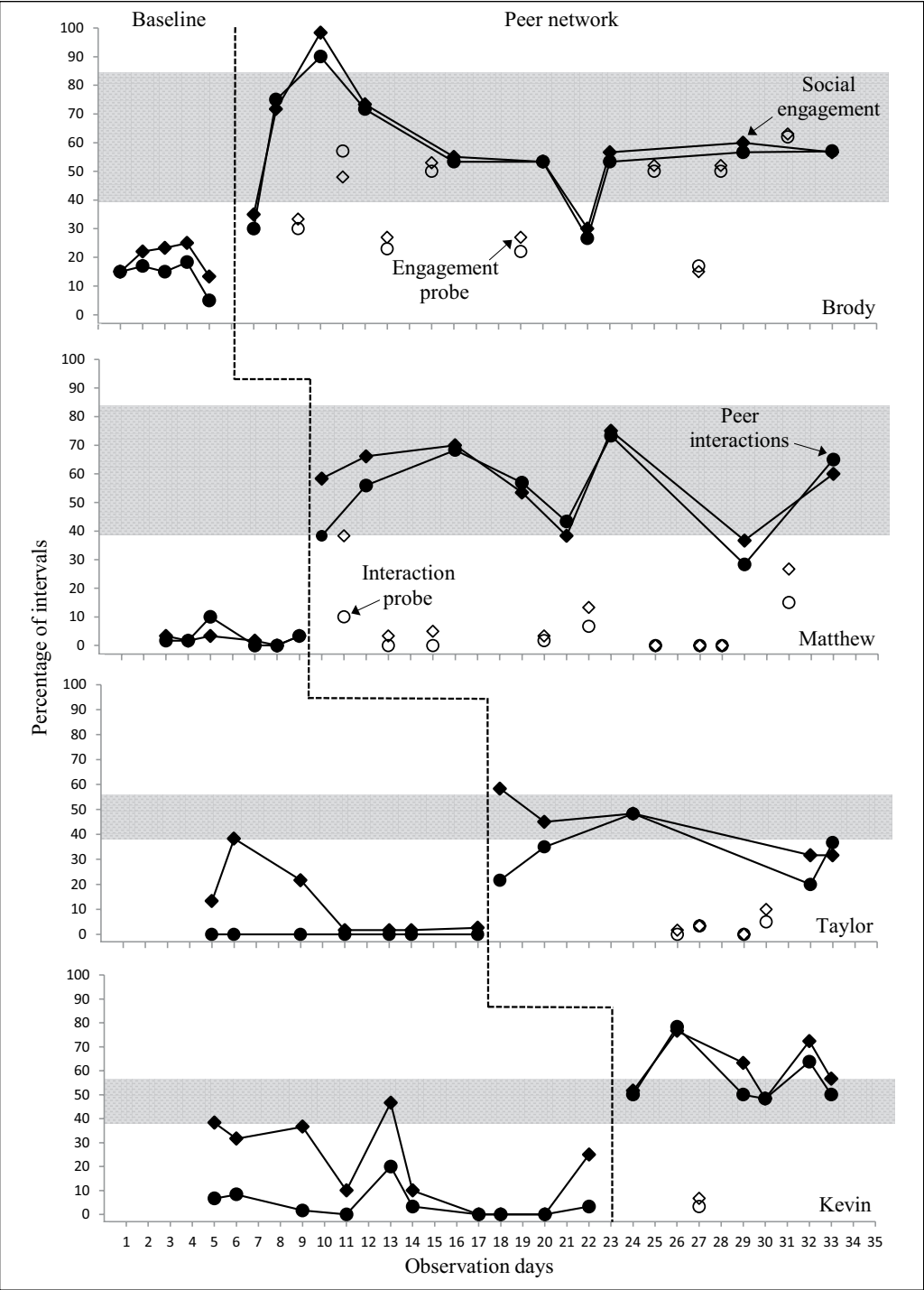


Figure 1. Percentage of intervals in which focus students were socially engaged with peers (closed squares), focus students interacted socially with peers (closed circles), focus students were socially engaged with peers on probe days (open squares), and focus students interacted socially with peers on probe days (open circles). Gray bars reflect peer comparison data for social interactions.

Table 2. Observational Measures by Study Phase.

	Brody			Matthew			Taylor			Kevin		
	Baseline	Peer network	Probes	Baseline	Peer network	Probes	Baseline	Peer network	Probes	Baseline	Peer network	Probe
Proximity												
To peer partners	0 (0-0)	64 (47-92)	44 (0-82)	0 (0-0)	80 (65-97)	10 (0-87)	0 (0-0)	74 (50-98)	0 (0-0)	0 (0-0)	85 (63-93)	0
To other peers	26 (13-48)	36 (3-75)	39 (2-80)	25 (3-57)	44 (0-76)	38 (0-87)	0 (0-0)	21 (0-53)	23 (0-92)	6 (0-62)	30 (0-72)	18
To SWD	51 (15-88)	51 (3-78)	40 (5-65)	49 (13-77)	31 (0-77)	56 (7-92)	98 (90-100)	66 (32-100)	99 (98-100)	58 (0-100)	51 (2-100)	8
Facilitator	0 (0-0)	25 (0-57)	6 (0-45)	0 (0-0)	27 (2-72)	10 (0-63)	0 (0-0)	86 (0-100)	45 (0-100)	0 (0-0)	92 (65-98)	0
To other educator	5 (0-8)	10 (0-77)	1 (0-5)	8 (0-30)	0 (0-2)	2 (0-2)	72 (2-100)	32 (0-80)	30 (0-63)	42 (0-92)	15 (2-75)	10
Social engagement												
Active	19 (13-23)	56 (27-98)	23 (9-37)	2 (0-3)	44 (28-53)	4 (0-13)	0 (0-2)	24 (15-40)	2 (0-3)	18 (0-42)	51 (40-72)	3
Passive	0 (0-2)	3 (0-12)	1 (0-5)	0 (0-0)	13 (3-22)	6 (0-33)	11 (2-38)	19 (0-40)	2 (0-7)	2 (0-7)	10 (3-20)	3
Unengaged	76 (63-87)	39 (2-70)	29 (13-45)	62 (27-80)	29 (13-46)	58 (25-93)	88 (62-98)	57 (42-68)	96 (90-100)	50 (0-90)	35 (23-52)	93
Gone	4 (0-22)	3 (0-15)	7 (0-20)	36 (20-70)	14 (0-23)	32 (7-72)	0 (0-0)	0 (0-0)	0 (0-0)	30 (0-100)	3 (0-18)	0
Social interactions												
To peer partners	0 (0-0)	44 (15-82)	22 (0-47)	0 (0-0)	40 (18-52)	1 (0-12)	0 (0-0)	23 (15-40)	0 (0-0)	0 (0-0)	48 (35-72)	0
From peer partners	0 (0-0)	47 (17-82)	24 (0-50)	0 (0-0)	11 (0-33)	1 (0-10)	0 (0-0)	28 (12-48)	0 (0-0)	0 (0-0)	53 (43-75)	0
To other peers	13 (5-18)	13 (3-22)	17 (2-28)	1 (0-3)	1 (0-3)	2 (0-5)	0 (0-0)	2 (0-12)	2 (0-3)	4 (0-20)	3 (0-12)	3
From other peers	13 (3-15)	11 (0-20)	15 (3-22)	3 (0-10)	7 (0-20)	3 (0-10)	0 (0-0)	2 (0-8)	2 (0-5)	4 (0-20)	3 (0-12)	2
To SWD	7 (2-10)	3 (0-13)	3 (0-7)	1 (0-2)	1 (0-3)	1 (0-3)	0 (0-2)	0 (0-2)	0 (0-2)	13 (0-35)	3 (0-7)	0
From SWD	2 (0-3)	2 (0-7)	3 (0-5)	1 (0-2)	1 (0-3)	1 (0-5)	3 (0-12)	0 (0-1)	1 (0-3)	11 (0-27)	2 (0-5)	2
To adults	4 (0-8)	11 (2-23)	5 (2-8)	1 (0-3)	40 (18-52)	1 (0-2)	2 (0-5)	12 (2-18)	3 (2-3)	13 (0-47)	23 (12-30)	10
From adults	4 (0-7)	11 (0-25)	2 (0-7)	2 (0-5)	12 (0-47)	1 (0-2)	4 (0-8)	25 (8-40)	7 (2-10)	12 (0-37)	26 (13-32)	10
Any peer interactions ^a	14 (5-18)	57 (27-90)	40 (17-62)	3 (0-10)	54 (28-73)	4 (0-15)	0 (0-0)	32 (20-48)	2 (0-5)	4 (0-20)	57 (48-78)	3
Facilitator supports	0 (0-0)	7 (0-20)	0 (0-0)	0 (0-0)	16 (0-53)	0 (0-2)	0 (0-0)	36 (16-70)	0 (0-0)	0 (0-0)	13 (0-30)	0
Social-related goals	0 (0-0)	13 (0-77)	2 (0-12)	0 (0-0)	4 (2-7)	1 (0-7)	0 (0-0)	17 (0-37)	1 (0-3)	0 (0-0)	51 (38-75)	0

Note. Numbers refer to means with ranges in parentheses. SWD = students with disabilities.

^aAny peer interactions refers to the percentage of intervals the focus student interacted with peer partners or other any other peers in the observation setting.

throughout the intervention, with Brody and Matthew displaying accelerating trends, considerable variability was evident for all four participants from one observation to the next. For all participants, the percentage of non-overlapping data between the baseline and intervention phases was 100%. Brody's peer interactions increased from 14% of intervals during baseline to 57% of intervals when meeting with his network. Matthew's peer interactions increased from 3% during the baseline phase to a mean of 54% during the intervention phase. Taylor had no peer interactions across all baseline observations. During the intervention phase, he had peer interactions during an average of 32% of intervals. Kevin increased his mean percentage of intervals with peer interactions from 4% during baseline to 57% during intervention. Generalization probe data indicate increases in peer interactions were largely limited to days when the peer networks actually met for three of the four participants. For Brody, however, the mean percentage of intervals with peer interactions remained substantially higher than in the baseline phase with a mean of 40% on days his network did not meet.

Social Engagement

Results for social engagement measures closely resembled peer interaction patterns. Given our interest in changes in any type of social participation, Figure 1 reflects total engagement (active + passive). (Table 2 reports active engagement, passive engagement, and unengaged separately.) During baseline, Brody and Kevin demonstrated low levels of social engagement; Matthew and Taylor were never or rarely socially engaged in this way, with the exception of one outlier for Taylor on baseline observation day 6, when the principal asked that all students with disabilities leave their table and sit throughout the cafeteria among peers without disabilities. Baseline levels of engagement for Brody and Matthew were generally stable and flat, whereas decelerating trends were apparent for Taylor and Kevin. Kevin's baseline data were highly variable, ranging from 0% to 48% of intervals engaged.

During the intervention phase, a substantial increase in level of social engagement was observed for all four participants, though such engagement was more variable than in baseline. Taylor's and Kevin's data pattern shifted from a decelerating trend to no trend, whereas during the intervention phase, data for Brody and Matthew show accelerating trends. For three of the four participants, the percentage of nonoverlapping data between phases was 100%. Brody's mean percentage of social engagement increased from 20% in baseline to 59% within the peer network intervention. During baseline, Matthew's mean percentage of social engagement was 2%. Upon introduction of the peer network, his percentage increased to 57%. The mean percentage of intervals during which Taylor was socially engaged with peers was 12% in baseline but increased to 43% during network meetings. Kevin's mean percentage of social engagement increased from 20% during baseline to 62% during the intervention phase. Generalization probe data indicate a near return to baseline levels of social engagement with peers on non-network days for everyone except Brody.

Social-Related Goal

Data on the demonstration of each participant's social-related goal indicate modest improvement for three of the students and substantial gains for Kevin (see Table 2). None of the focus students demonstrated the target behavior during baseline. Throughout the intervention phase, mean percentage of intervals in which the target social-related behavior was observed increased to 13%, 4%, 17%, and 50% for Brody, Matthew, Kevin, and Taylor, respectively.

Facilitator Support Behaviors

The percentage of intervals in which a facilitative support behavior was observed during the intervention phase varied substantially across students (range 7%–30%). Brody, the student with the highest baseline rates of social interactions and active social engagement, received the least amount of facilitation ($M = 7\%$ of

intervals), and Taylor, the participant with the most severe autism rating on the CARS-2 and who was also minimally verbal, had the greatest number of intervals with facilitative support behaviors ($M = 36\%$ of intervals).

Proximity

During the baseline phase, the focus students spent the majority of their lunchtime solely in proximity to other students with disabilities (range 49%–98%; see Table 2). Upon introduction of the peer network intervention, proximity to peers with disabilities decreased (range 31%–65%), whereas proximity to peer partners increased to a mean of 82% (range 64%–85%) across participants. Proximity to students with disabilities still remained high during intervention, as some students with disabilities not participating in the study periodically joined the table at which the network was meeting. From baseline to intervention phase, the focus students also had an increase in their proximity to peers who were not participating in the network (from 14% to 33%, respectively).

Social Validity

Social validity survey responses are shown in Tables 3 and 4. Facilitators and peers were interested in implementing the strategy again, wanted to be involved in a network in the future, and perceived the students with ASD benefited socially from having a peer group. Facilitators indicated they could use the strategies learned through this project with other students, the amount of time required to use the strategy was reasonable, the students with ASD benefited in other ways from having a peer group, and the focus students had more friends. Facilitators did not think implementation of this strategy required considerable support, nor did it negatively affect other students in the school.

Peers all said they and their partner benefited socially from being a part of a peer group. All expressed interest in being a peer group member in the future and thought other students in the school should do the same.

Similarly, students with ASD and parents responded positively when asked if the student liked spending time with the peer group members at school and if the student would like to be involved in a peer group in the future. In response to the open-ended questions, facilitators said the group meetings went really well, and they noticed more friendships and interactions among participating students with and without ASD. Some noticed the peers began showing interest and awareness in other students with disabilities at the school, not just the focus students. One facilitator stated, “I especially liked the interaction and the interest other students in the school exhibited.” They suggested two areas for improvement: finding more interested peers and starting earlier in the school year.

Peers noted their partners began to interact more and appeared “not as shy.” In addition, they noticed changes in the partners outside of the network meetings. One peer said her network partner with ASD “talks with us more when he sees us in the halls.” Another noted, “I think he is more able to talk in conversation with people outside of [the group].” Peers also described feeling “like a good role model” and understanding their partners and classmates with disabilities more. Some peers said the location and the time could have been better, because “sometimes it was hard to focus in the cafeteria because it was loud.” Students with ASD all named network members as their friends, and all wanted to continue hanging out with them. Parents also said their children benefited socially and they wanted them to continue being part of a group.

Discussion

Social relationships with peers can make important contributions to quality of life during adolescence. For youth with ASD the presence of social-skill and communication challenges can often limit the opportunities students have to establish social connections with their peers and restrict their social networks. Peer-mediated interventions have been advocated as an effective strategy for improving social interactions and social skills of stu-

Table 3. Student and Parent Perspectives on Social Validity.

Questions	Brody		Matt		Taylor		Kevin	
	P	S	P	S	P	S	P	S
Common questions: Parent [Student]								
Does your child [Do you] like going to school?	Y	Y	Y	Y	Y	Y	Y	Y
Does your child [Do you] have friends at school?	Y	Y	Y	Y	U	Y	Y	Y
Did your child [you] like spending time with students from the peer group [names of peer partners] during the day?	Y	Y	Y	Y	Y	Y	Y	Y
Would you like your child [Would you like] to continue being part of a peer group next school year [to keep hanging out with (names of peer partners)]?	Y	Y	Y	Y	Y	Y	Y	Y
Parent-specific questions								
Did your child spend any time with the peers from this group outside of the school day?	N		N		Y		Y	
Did your child ever talk about the peers from this group to you?	Y		N		N		Y	
Do you feel your child benefited socially from being part of this group?	Y		Y		U		Y	
Student-specific questions								
Did you like spending time with [names of peer partners]?		Y		Y		Y		Y
Did spending time with [names of peers partners] help you learn new things?		Y		Y		Y		Y
Are [names of peer partners] your friends?		Y		Y		Y		Y

Note. P = parent; S = student; Y = yes; N = no; U = unsure.

dents with ASD (Carter, Common, et al., 2014; Hughes et al., 2013). We examined the efficacy and social validity of peer networks implemented during lunch periods for high school students with ASD. Our findings extend the literature on promoting social-focused peer interaction among adolescents in several ways.

First, observations during the baseline phase highlight the necessity of introducing intervention efforts into unstructured high school contexts. Noninstructional school activities, such as lunch, are highly social contexts in which specific social-related skills and peer interac-

tions can be readily fostered. Yet we found that social interactions among students with and without ASD occurred very infrequently (if at all), despite both groups of students being in the same cafeteria. This paucity of interaction absent intervention is consistent with prior descriptive studies involving students with moderate-to-severe intellectual disability (e.g., Carter et al., 2005; Cutts & Sigafoos, 2001). A number of factors might contribute to the limited conversations and social engagement observed during baseline conditions. Social-skill and communication challenges are key components of the diagnostic criteria of ASD

Table 4. Peer and Facilitator Perspectives on Social Validity.

Question	Brody		Matt		Taylor		Kevin	
	F	P	F	P	F	P	F	P
Common questions: Facilitator [Peer]								
I feel I was effective in this role.	4	4/5/5	4	4/4/5	5	5/5	5	5
I am interested in implementing this strategy again. [I would be a peer group member again in the future.]	5	5/5/5	5	5/5/5	5	5/5	5	5
The student with ASD [My partner] benefited socially from having a peer group.	5	5/5/5	5	5/5/5	5	5/5	5	5
The peers without ASD [I] benefited socially from being a peer group member.	5	4/5/5	5	5/5/5	5	5/5	4	5
The peers without ASD [I] benefited in other ways from being a peer group member.	5	4/4/5	5	5/5/5	5	5/5	4	5
Overall, I enjoyed participating [being] in this project.	5	5/5/5	5	5/5/5	5	5/5	5	5
Facilitator-specific questions								
The amount of time required to use this strategy was reasonable.	4		4		5		4	
The amount of time required for record keeping with this strategy was reasonable.	4		4		5		4	
I would need ongoing consultation to keep implementing this strategy.	2		2		4		3	
Implementation of this strategy required considerable support from other school staff.	3		3		1		2	
I implemented this strategy with a good deal of enthusiasm.	4		4		5		5	
I am motivated to continue using this strategy.	4		4		5		5	
This strategy was a good way to address the educational needs of the student with ASD.	4		4		1		2	
This strategy fits well within this school.	5		5		3		3	
I understood the procedures of this strategy.	4		4		5		5	
I would know what to do if I was asked to implement this strategy again.	4		4		5		5	
The student with ASD benefited in other ways from having a peer group.	5		5		5		5	
The student with ASD has more friends as a result of this project.	5		5		5		5	
This strategy negatively affected other students in the school.	2		2		1		1	
I could use the strategies I learned through this project with other students.	5		5		5		5	
Peer-specific questions								
At first, I was excited to become a peer group member.		5/5/5		5/5/5		5/5		5
I felt confident serving in this role.		4/5/5		4/5/5		5/5		5
I had enough help from a teacher to do this role well.		5/5/5		5/5/5		5/5		5
The amount of work I did for the group was reasonable.		4/5/5		4/4/5		5/5		5

(continued)

Table 4. (continued)

Question	Brody		Matt		Taylor		Kevin	
	F	P	F	P	F	P	F	P
The initial orientation meeting with a teacher was helpful.		5/5/5		4/5/5		5/5		5
Other students in the school should also do this.		5/5/5		5/5/5		5/5		5
I understand why teachers thought a peer group would be helpful for my partner.		5/5/5		4/5/5		5/5		5
Our school should have more peer groups for students.		5/5/5		5/5/5		5/5		5
My partner benefited academically from having a peer group.		4/4/4		4/4/4		4/4		5
I consider my partner to be a friend.		5/5/5		5/5/5		5/5		5
I would recommend being a group member to my other friends.		5/5/5		5/5/5		5/5		5
My views about students with ASD have changed for the better.		5/5/5		4/4/4		5/5		5
I spend time with other students who have ASD at my school.		4/5/5		2/3/3		5/5		5

Note. F = facilitator; P = peer partners; ASD = autism spectrum disorder. Survey responses: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

(American Psychiatric Association, 2013), limiting the extent to which students may have initiated or responded to social interactions. Similarly, peers without disabilities may have been reluctant to initiate conversations with students with ASD based on attitudinal barriers, because of the close proximity of special education staff, or because peer groups within the cafeteria were already well established by the start of the spring semester (e.g., Carter et al., 2008; Carter, Hughes, Copeland, & Breen, 2001). Each of these potential factors is worthy of additional exploration.

The primary barrier to social interaction for students with ASD in this study may have been not social-related skill deficits but, rather, limited structured opportunities to connect with peers without disabilities.

Second, peer networks resulted in substantial increases in both peer interactions and social engagement for all four students. Although still quite variable, these interactions remained fairly high throughout implementation of the network across the spring semester and approximated those observed for peers without disabilities. These findings are consistent with previous evaluations of peer networks at the middle (Haring & Breen, 1992) and elementary (Garrison-Harrell et al., 1997) levels. As a multicomponent intervention package, it is not possible in this study to disentangle which elements of the network are essential to or responsible for these improvements. For example, the invitation to be part of the network may have simply cued peers to a social opportunity they had not otherwise recognized, the orientation meeting may have addressed any initial hesitation or questions students with and without ASD may have had about interacting with one another, the regular meetings may have set the occasion and expectation for ongoing interaction, and the involvement of an adult may have provided the facilitation and reinforcement students needed to sustain those interactions. Although we consider all of these components to be conceptually important to

the functioning of a peer network, it is unclear whether each one on its own is necessary or sufficient to produce the social improvements we observed.

It is important to note that social-skill instruction did not precede the launching of the peer network. Thus, our findings suggest the primary barrier to social interaction for students in this study may have been not social-related skill deficits but, rather, limited structured opportunities to connect with peers without disabilities. Consistent with other peer-mediated studies occurring both within and beyond the classroom (Carter, Moss, Hoffman, Chung, & Sisco, 2011; L. Koegel, Vernon, Koegel, Koegel, & Paullin, 2012), social interactions increased without introducing explicit social-skills instruction. Instead, prompting and reinforcement of specific social skills were addressed within the context of the peer networks, and all four students were observed to increase their use of those targeted skills.

Third, we found that social outcomes did not consistently generalize for students within the cafeteria. For all but one student, increases in social interaction and engagement with peers without disabilities within the same cafeteria were largely limited to peer network meeting days. We conducted generalization probes on school days when the student with ASD and his peer network members were present in the lunchroom but no network meeting was scheduled. Although generalized social outcomes is an often-cited problem in this literature (cf., Carter et al., 2010), we anticipated students would still choose to connect with one another periodically during lunch even when networks did not meet. Although these connections happened in other settings throughout the school (as reported during network meetings), they were less common in the cafeteria. It may be that peers instead chose to spend lunch with other preferred friends, viewed their connections as being limited to network meeting days, or did not realize they were allowed to sit together outside of official meetings. Brody represented the exception, as he maintained high levels of social engagement and interactions

on generalization probe days. Although his baseline levels of both behaviors were the highest of all participants, his percentages of intervals engaged and interacting with peers were higher on probe days. School and research staff described Brody as the “most social” of the participants who appeared “most interested in peers.”

Fourth, participating students and staff considered the peer network intervention to be feasible and acceptable. Designing school interventions that are effective yet respectful of scarce teacher time, as well as enjoyable and rewarding for all students involved, is paramount for buy-in, implementation, and continued fidelity. All three facilitators considered peer networks to be effective, enjoyable, and a reasonable time commitment. This finding is especially important given both schools were fairly resource stretched. More important, they felt equipped to use the strategies with other students and were motivated to continue using peer networks. All peer partners reported they enjoyed participating in this project, indicated they would be a peer partner again, and thought their school should have more peer groups. All but two (Kevin’s peer partners) who had a scheduling conflict maintained their involvement until the end of the semester. Perhaps the most intriguing results were that all peer partners and the student with ASD considered each other to be friends at the end of the semester.

Limitations and Future Research

Several limitations of this study warrant consideration. First, although peer network interventions were effective at increasing initiations and responses within conversations with peers, we did not collect data on the quality of these interactions. Future studies should incorporate measures of reciprocity, affect, conversation maintenance, and topic relevance to further elucidate the nature of students’ interactions within peer network interventions.

Second, considerable variability in the communicative skills of students with ASD was evident. Three of the four participants in this study communicated primarily through speech,

which likely affected the nature of their networks. Further research is needed to explore how best to design and deliver peer network interventions for students who are nonverbal or use augmentative and alternative communication devices (e.g., Chung & Carter, 2013).

Third, the challenges of observing in loud and busy cafeterias limited our ability to remain unobtrusive or to collect data on more discreet interactive behaviors. Noise levels, along with the low speaking volume of some participants, made it necessary for observers to sit fairly close to peer networks and to shift locations when students changed positions. Peer network interventions should be examined using additional methods that would capture the nature of students’ interactions in contexts when the presence of others might influence the nature of ongoing interactions (e.g., videotaping, audio recording).

Fourth, the competence, confidence, and connections of the peer network facilitator are likely important factors influencing the success of a peer network. Leading such a group may not be easily undertaken by anyone in a school. Which qualities and commitments contribute to making someone an effective facilitator certainly warrants additional exploration. For example, we noticed that the recruitment, training, and ongoing support seemed much easier at the school where the facilitator was a very popular teacher with abundant social capital with the student body. He was able to easily recruit multiple peers, and all of the peers stayed involved throughout the semester. Recruitment at the second school was much more difficult despite great effort and buy-in from the facilitators, as they had few connections to peers without disabilities.

The competence, confidence, and connections of the peer network facilitator are likely important factors influencing the success of a peer network.

Fifth, the presence of adult facilitators remained fairly prominent within the peer networks of both Taylor and Kevin. Additional research is needed to explore more closely the

facilitation strategies adults provide within these interventions and their contributions to student enjoyment and outcomes. Because typical adolescent interactions often take place outside the purview of adults, efforts should be made to systematically fade back their close proximity in ways that support the maintenance and generalization of social connections.

Finally, these interventions focused primarily on increasing social interactions and targeted behaviors within shared activities. Although the students involved in these interventions described themselves as friends at the end of the semester, we captured little about the nature of these relationships. Peers were not explicitly assigned instructional roles; however, it is possible they viewed these new relationships differently than those they have with other schoolmates. Future studies are needed to explore the nature and quality of relationships developing within peer network interventions.

For youth with ASD, social-skill and communication deficits can limit interactions and social connectedness with peers. Peer-mediated interventions are an effective strategy to promote social interactions and improve social skills for students with ASD but have typically focused on younger students in structured classroom settings. Unstructured portions of the school day (e.g., lunch, recess, transitions, gym) are prime socialization periods for general education peers but prove to be particularly isolating for students with ASD. Results from this study indicate peer networks are both feasible and effective within lunchroom contexts, providing promising support for their utility in increasing social interactions and engagement for high school students with ASD.

Authors' Note

The work reported here was supported by the Institute of Education Sciences, U.S. Department of Education, through Grant R324C120006 awarded to University of North Carolina at Chapel Hill.

References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: Author.
- Bene, K., Banda, D. R., & Brown, D. (2014). A meta-analysis of peer-mediated instructional arrangements and autism. *Review Journal of Autism Spectrum Disorders, 1*, 135–142. doi:10.1007/s40489-014-0014-9
- Carter, E. W., Asmus, J., Moss, C. K., Cooney, M., Weir, K., Vincent, L., . . . Fesperman, E. (2013). Peer network strategies to foster social connections among adolescents with and without severe disabilities. *TEACHING Exceptional Children, 46*(2), 51–59.
- Carter, E. W., Bottema-Beutel, K., & Brock, M. E. (2014). Social interactions and friendships. In M. Agran, F. Brown, C. Hughes, C. Quirk, & D. Ryndak (Eds.), *Equity and full participation for individuals with severe disabilities: A vision for the future* (pp. 197–216). Baltimore, MD: Brookes.
- Carter, E. W., Common, E. A., Sreckovic, M. A., Huber, H. B., Bottema-Beutel, K., Gustafson, J. R., . . . Hume, K. (2014). Promoting social competence and peer relationships for adolescents with ASD. *Remedial and Special Education, 35*, 27–37. doi:10.1177/0741932513514618
- Carter, E. W., Cushing, L. S., & Kennedy, C. H. (2009). *Peer support strategies: Improving all students' social lives and learning*. Baltimore, MD: Brookes.
- Carter, E. W., Hughes, C., Copeland, S. R., & Breen, C. (2001). Differences between high school students who do and do not volunteer to participate in peer interaction programs. *Journal of the Association for Persons With Severe Handicaps, 26*, 229–239. doi:10.2511/rpsd.26.4.229
- Carter, E. W., Hughes, C., Guth, G., & Copeland, S. R. (2005). Factors influencing social interaction among high school students with intellectual disabilities and their general education peers. *American Journal on Mental Retardation, 110*, 366–377. doi:10.1352/0895-8017(2005)110[366:FISIAH]2.0.CO;2
- Carter, E. W., Moss, C. K., Hoffman, A., Chung, Y., & Sisco, L. (2011). Efficacy and social validity of peer support arrangements for adolescents with disabilities. *Exceptional Children, 78*, 107–125.
- Carter, E. W., Sisco, L. G., Brown, L., Brickham, D., & Al-Khabbaz, Z. A. (2008). Peer interactions and academic engagement of youth with developmental disabilities in inclusive middle and high school classrooms. *American Journal on Mental Retardation, 113*, 479–494. doi:10.1352/2008.113:479-494
- Carter, E. W., Sisco, L. G., Chung, Y., & Stanton-Chapman, T. L. (2010). Peer interactions of stu-

- dents with intellectual disabilities and/or autism: A map of the intervention literature. *Research and Practice for Persons With Severe Disabilities*, 35, 63–79. doi:10.2511/rpsd.35.3-4.63
- Chung, Y., & Carter, E. W. (2013). Promoting peer interactions in inclusive classrooms for students with speech-generating devices. *Research and Practice for Persons With Severe Disabilities*, 32, 94–109. doi:10.2511/027494813807714492
- Cutts, S., & Sigafoos, J. (2001). Social competence and peer interactions of students with intellectual disability in an inclusive high school. *Journal of Intellectual and Developmental Disability*, 26, 127–141. doi:10.1080/1366825002005444
- Garrison-Harrell, L., Kamps, D., & Kravitz, T. (1997). The effects of peer networks on social-communicative behaviors for students with autism. *Focus on Autism and Other Developmental Disorders*, 12, 241–254. doi:10.1177/108835769701200406
- Gresham, F., & Elliot, S. (2008). *Social skills improvement system*. San Antonio, TX: Pearson.
- Haring, T. G., & Breen, C. G. (1992). A peer-mediated social network intervention to enhance the social integration of persons with moderate and severe disabilities. *Journal of Applied Behavioral Analysis*, 25, 319–333. doi:10.1901/jaba.1992.25-319
- Hughes, C., Kaplan, K., Bernstein, R., Boykin, M., Reilly, C., Brigham, N., . . . Harvey, M. (2013). Increasing social interaction skills of secondary school students with autism and/or intellectual disability: A review of interventions. *Research and Practice for Persons With Severe Disabilities*, 37, 288–307. doi:10.2511/027494813805327214
- Individuals with Disabilities Education Act, 20 U.S.C. § 1400 *et seq.* (2006).
- Killen, M., & Coplan, R. J. (Eds.). (2011). *Social development in childhood and adolescence: A contemporary reader*. New York, NY: Wiley.
- Koegel, R. L., Fredeen, R., Kim, S., Danial, J., Rubenstein, D., & Koegel, L. (2012). Using perseverative interests to improve interactions between adolescents with autism and their typical peers in school settings. *Journal of Positive Behavior Interventions*, 14, 133–141. doi:10.1177/1098300712437043
- Koegel, L. K., Vernon, T. W., Koegel, R. L., Koegel, B. L., & Paullin, A. W. (2012). Improving social engagement and initiations between children with autism spectrum disorder and their peers in inclusive settings. *Journal of Positive Behavior Interventions*, 14, 220–227. doi:10.1177/1098300712437042
- McLeskey, J., Landers, E., Williamson, P., & Hoppey, D. (2012). Are we moving toward education students with disabilities in less restrictive settings? *The Journal of Special Education*, 46, 131–140. doi:10.1177/0022466910376670
- Owen-DeSchryver, J. S., Carr, E. G., Cale, S. I., & Blakeley-Smith, A. (2008). Promoting social interactions between students with autism spectrum disorders and their peers in inclusive school settings. *Focus on Autism and Other Developmental Disabilities*, 23, 15–28. doi:10.1177/1088357608314370
- Radley, K. C., Ford, B. W., Battaglia, A. A., & McHugh, M. B. (2014). The effects of a social skills training package on social engagement of children with autism spectrum disorders in a generalized recess setting. *Focus on Autism and Other Developmental Disabilities*. Advance online publication. doi:10.1177/1088357614525660
- Rubin, K. H., Bukowski, W. M., & Laursen, B. (Eds.). (2009). *Handbook of peer interactions, relationships, and groups*. New York, NY: Guilford Press.
- Ryan, A. M., & Ladd, G. W. (Eds.). (2012). *Peer relationships and adjustment at school*. Charlotte, NC: Information Age.
- Schopler, E., Van Bourgondien, M., Wellman, G., & Love, S. (2010). *Childhood Autism Rating Scale* (2nd ed.). San Antonio, TX: Pearson.
- Sparrow, S., Cicchetti, D., & Balla, D. (2005). *Vineland Adaptive Behavior Scales* (2nd ed.). San Antonio, TX: Pearson.
- Wagner, M., Cadwallader, T. W., Garza, N., & Cameto, R. (2004). Social activities of youth with disabilities. *NLTS2 Data Brief*, 3(1), 1–4.
- Webster, A. A., & Carter, M. (2007). Social relationships and friendships of children with developmental disabilities: Implications for inclusive settings. A systematic review. *Journal of Intellectual and Developmental Disability*, 32, 200–213. doi:10.1080/13668250701549443